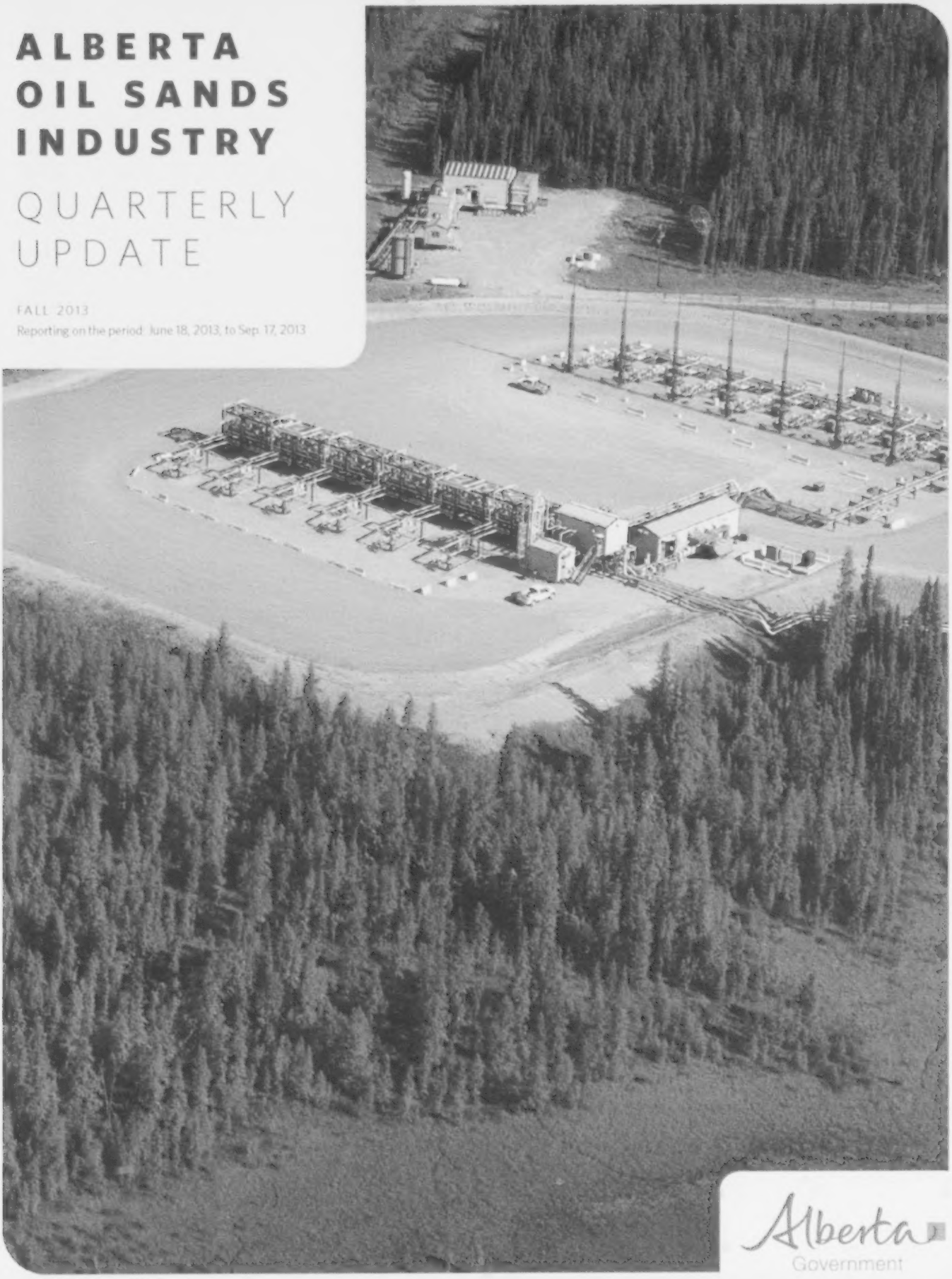
ALBERTA OIL SANDS INDUSTRY

QUARTERLY UPDATE

FALL 2013

Reporting on the period: June 18, 2013, to Sep. 17, 2013



Alberta Government

All about the oil sands

Background of an important global resource

TABLE OF CONTENTS

02 **All about the oil sands**

03 **Mapping the oil sands**

04 **Government update**

07 **NEWS: What's new in the oil sands**

10 **Project listings**

15 **Glossary of oil sands terms**

Front and back cover images: Cenovus Energy

Unless otherwise stated, all photos copyright JuneWarren-Nickle's Energy Group © 2013

Canada has the third-largest oil reserves in the world, after Saudi Arabia and Venezuela. Of Canada's 173 billion barrels of oil reserves, 170 billion barrels are located in Alberta, and about 168 billion barrels are recoverable from bitumen. This is a resource that has been developed for decades but is now gaining increased global attention as conventional supplies—so-called "easy" oil—continue to be depleted. The figure of 168 billion barrels of bitumen represents what is considered economically recoverable with today's technology, but with new technologies, this reserve estimate could be significantly increased. In fact, total oil sands reserves in place are estimated at 1.8 trillion barrels.

There are three major bitumen (or oil sands) deposits in Alberta. The largest is the Athabasca deposit, which is located in the province's northeast in the Regional Municipality of Wood Buffalo. The main population centre of the Athabasca deposit is Fort McMurray. The second-largest oil sands deposit is referred to as Cold Lake, just south of Athabasca, with the main population centre the City of Cold Lake. The smallest oil sands deposit is known as Peace River, which is located in northwest-central Alberta. A fourth deposit called Wabasca links to the Athabasca and is generally lumped in with that area.

The existence of bitumen in Alberta has been known for a long time. The first mention of it in Canadian history was in 1719, when a Cree named Wapasu brought a sample of the "gum" to a Hudson's Bay trading post. First Nations in what is now the Wood Buffalo area had traditionally used the bitumen, which seeps from outcrops along the Athabasca River, to waterproof their canoes.

For the first time in 2012, in situ oil sands production exceeded mined oil sands production in Alberta. In 2012, 52 per cent of the province's oil sands volumes were produced using in situ methods. Alberta will continue to rely to a greater extent on in situ production in the future, as 80 per cent of the province's proven bitumen reserves are too deep underground to recover using mining methods.

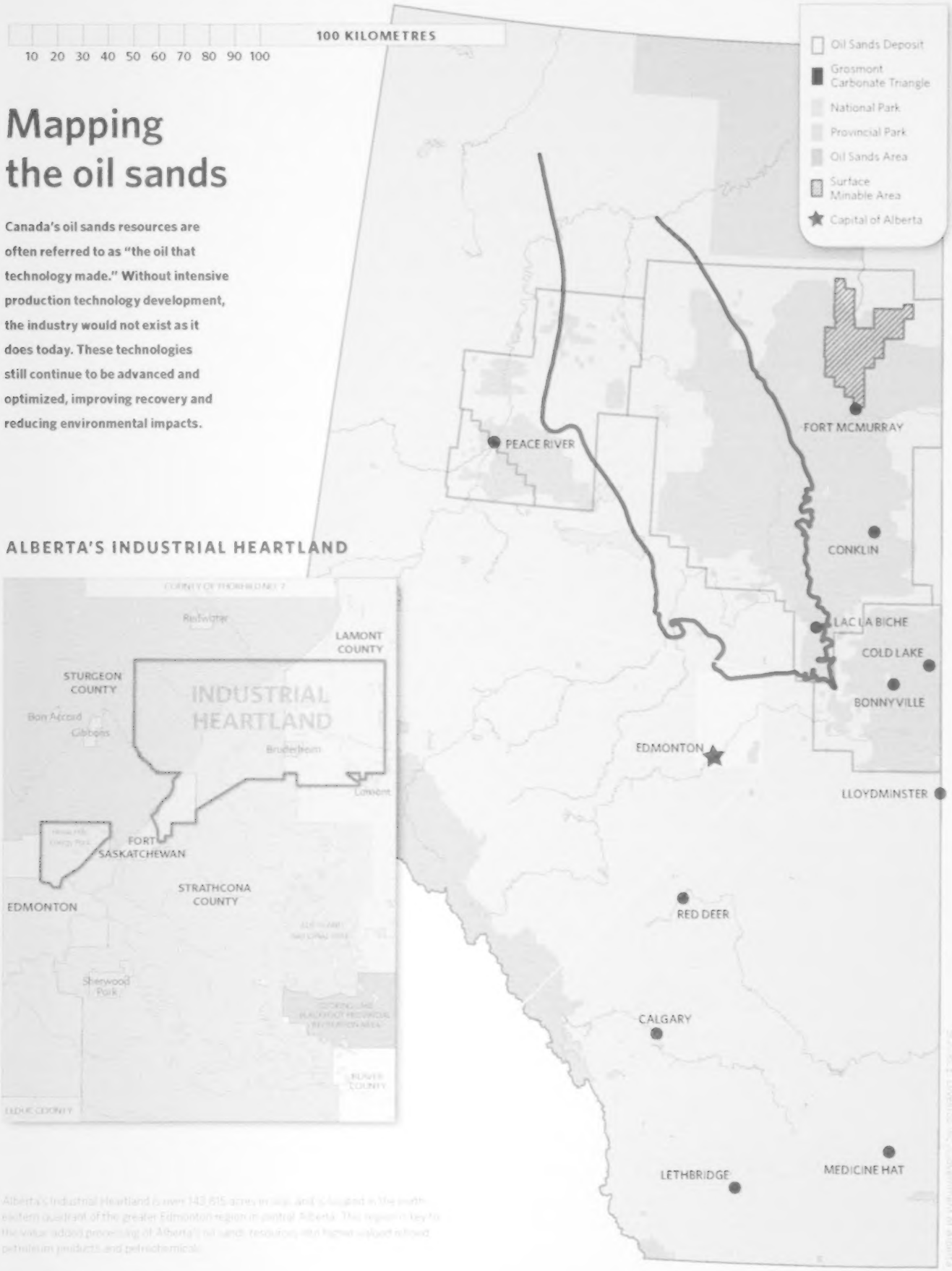
There are essentially two commercial methods of in situ (Latin for "in place," essentially meaning wells are used rather than trucks and shovels). In cyclic steam stimulation (CSS), high-pressure steam is injected into directional wells drilled from pads for a period of time, then the steam is left to soak in the reservoir for a period, melting the bitumen, and then the same wells are switched into production mode, bringing the bitumen to the surface.

In steam assisted gravity drainage (SAGD), parallel horizontal well pairs are drilled from well pads at the surface. One is drilled near the top of the target reservoir, while the other is drilled near its bottom. Steam is injected into the top well, a steam chamber forms, and the melted bitumen flows into the lower well via gravity and is pumped to the surface using artificial lift.

Both SAGD and CSS are used in the Cold Lake and Peace River deposits, while SAGD is the in situ technology of choice in the Athabasca deposit. The selection is based on a number of factors, including geology. The technologies combined currently produce just over one million barrels per day.

Research is underway on a number of other production technologies designed to optimize production, including variations on solvent-assisted SAGD and CSS, recovery using electricity and in situ combustion.

Bitumen that has not been processed, or "upgraded," can be used directly as asphalt. It must be diluted to travel by pipeline. Adding value, some producers upgrade their product into synthetic crude oil, which is a refinery feedstock. That can be transformed into transportation fuels and other products. ■



Mapping the oil sands

Canada's oil sands resources are often referred to as "the oil that technology made." Without intensive production technology development, the industry would not exist as it does today. These technologies still continue to be advanced and optimized, improving recovery and reducing environmental impacts.

Alberta's Industrial Heartland covers 143,615 acres in size and is located in the north-eastern quadrant of the greater Edmonton region in central Alberta. This region is key to the value-added processing of Alberta's oil sands resources into higher-valued refined petroleum products and petrochemicals.

GOVERNMENT UPDATE

ENERGY EAST ANNOUNCEMENT A WIN FOR CANADA

Premier Alison Redford issued the following statement in response to the announcement that TransCanada Corporation is proceeding with the Energy East Pipeline project to Quebec and New Brunswick:

"I am very pleased with [the] announcement that Energy East is moving forward. My government made a commitment to the project as part of our efforts to build new markets and get a fairer price for the oil resources Albertans own. This is truly a nation-building project that will diversify our economy and create new jobs here in Alberta and across the country.

"The partnerships we have seen develop across the country on projects like Energy East are the clearest examples yet of the Canadian Energy Strategy in action. That's why I've been pushing the strategy – to spur cooperation between the provinces in getting Canada's energy onto international markets, to get fairer prices and in turn be able to provide the high quality of living Albertans and Canadians deserve. Building new markets is a key part of our government's Building Alberta Plan.

"At [the recent] Council of the Federation meeting, we reached consensus on a Canadian Energy Strategy and agreed on 10 action areas for moving the strategy forward. I'm proud of what we have achieved so far, and I will continue working with other premiers to build new energy export markets. All Canadians benefit from a strong energy economy, and we are stronger working together."

PREMIERS REDFORD AND CLARK WORKING TOGETHER TO GROW ALBERTA AND B.C. RESOURCES SECTORS

B.C. Premier Christy Clark and Alberta Premier Alison Redford announced they have appointed a working group led by the two top energy officials from each province to develop recommendations related to energy exports and opening new export markets. Clark emphasized that the two provinces have a common interest in the responsible development and export of energy resources.

In creating the working group, Alberta and British Columbia identified the shared goal of opening new markets and expanding export opportunities for oil, gas and other resources. Recommendations will be presented to the premiers later this year.

BUILDING FORT MCMURRAY

As part of the Redford government's commitment to build Alberta, the province is announcing an allocation of Crown lands to the Regional Municipality of Wood Buffalo that will make an area twice the current size of Fort McMurray available for much-needed development.

The land, known as the Urban Development Sub-Region (UDSR), will encourage housing in new communities, commercial ventures, vital infrastructure, and parks and recreational areas, as well as the jobs needed to further develop the fastest-growing city in Canada.

The additional land, covering over 55,000 acres, will be available for sale to the Regional Municipality of Wood Buffalo, allowing Fort McMurray to expand to the east, south and west. The land is expected to meet the growth needs of the municipality for over 25 years.

The land made available was determined based on resource analysis, municipal growth plans, and consultation with First Nations and stakeholders, including industry and the public. The region creates a balance of urban growth with responsible energy development, allowing for safe communities to be built and the local economy to prosper.

Fort McMurray will become an even greater place to work, live and raise families. As land is allocated from the region over the coming decades, the province and the regional municipality are well equipped to coordinate future development with the province's infrastructure planning. The UDSR also gives industry a long-term vision for future urban development in the area that is vital to their planning and investment in the area.

ALBERTA LEADS IN PIPELINE SAFETY

An independent review has confirmed that Alberta leads in pipeline safety and provides the most thorough overall pipeline regulatory regime of all assessed jurisdictions. Alberta's high regulatory standards for pipeline infrastructure guide the activities of all companies doing business in the province to ensure the health and safety of Albertans.

The report, a comprehensive third-party review conducted by Group 10 Engineering Ltd., concluded that Alberta has become a leader in establishing best practices to manage the industry appropriately. It also concluded that while all the examined jurisdictions conform to pipeline requirements established by the Canadian Standards Association, there is no "one size fits all" approach on how to best ensure pipeline safety.

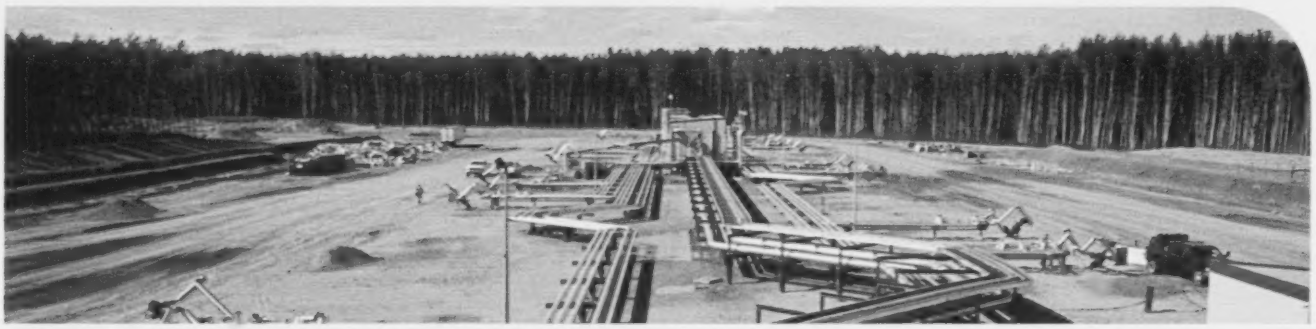


PHOTO: Suncor Energy

The review contained 17 recommendations intended to further improve the integrity and reliability of Alberta's pipeline infrastructure. Most of the recommendations fall under the responsibility of the Alberta Energy Regulator (AER), which has already begun to address them.

In addition to acting on recommendations in the report, Alberta Minister of Energy Ken Hughes will also ask the AER to lead the development of a management system to ensure operators are using leading-edge information technology to respond quickly and effectively to pipeline incidents. The system will have the ability for real-time tracking and tracing the history of pipeline equipment. It will mitigate risk and prevent future incidents, and will be integrated into the reporting requirements of the regulators.

Alberta's high regulatory standards for pipeline infrastructure guide the activities of all companies doing business in the province to ensure the health and safety of Albertans.

AER TO ENSURE EFFICIENT, COMPREHENSIVE ENERGY REGULATION

The Alberta Energy Regulator (AER) was officially launched on June 17, 2013, after the Government of Alberta proclaimed the Responsible Energy Development Act, ushering in a new era in energy regulation.

The AER brings a new governance structure that will achieve the benefits of strong corporate oversight and independent adjudication of energy applications throughout the hearing process.

The announcement is the first step in a phased approach towards full implementation of the AER with additional regulatory functions to be added over the coming months.

The AER immediately takes on all regulatory functions previously carried out by the Energy Resources Conservation Board and will assume additional responsibilities in the areas of public lands, water and the environment over the next 12 months.

The AER ensures the safe, efficient, orderly and environmentally responsible development of hydrocarbon resources over their entire life cycle. This includes allocating and conserving water resources, managing public lands and protecting the environment while providing economic benefits for all Albertans.

AER LAUNCHES ONLINE INCIDENT REPORTING ON AER.CA

The Alberta Energy Regulator has launched an online tool to post all pipeline incidents as well as any energy-related incidents that may impact the public. This will enhance regulatory transparency, improve access to information and ensure that Albertans are better informed about the regulator's activities and role during incident response.

PUBLIC INPUT SOUGHT TO IMPROVE CARBON CAPTURE RULES

The Alberta government is seeking public input to help ensure the province has the strongest possible rules governing carbon capture and storage (CCS).

Alberta Energy has completed an extensive review that resulted in over 70 conclusions and recommendations aimed at improving CCS regulation in Alberta, and it is now providing an opportunity for the public to comment on proposed changes.

"Carbon capture and storage is a critical part of our government's commitment to responsible energy development and reducing our carbon footprint. It will also generate more royalty revenues from enhanced oil recovery with carbon dioxide," said Minister of Energy Ken Hughes.

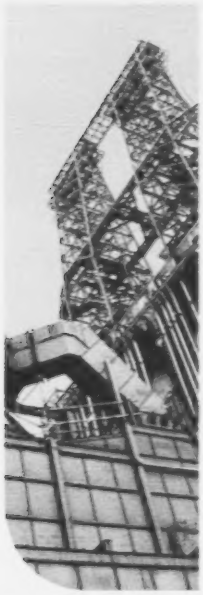
"We must ensure CCS is conducted in the safest and most environmentally responsible way possible. That's why we have been working with world experts and local leaders to look at how we can improve the regulations we have now, and it's why we are asking the public for their say."

Alberta has committed $170 million in 2013-14 and a total of $1.3 billion over 15 years to fund two large-scale CCS projects that will help reduce CO_2 emissions from oil sands refining.

The CCS Regulatory Framework Assessment, announced in 2011, looked at both the current rules for CCS in Alberta and best practices from around the world. Over 100 global experts from industry, environmental groups, academics and government participated in the review.

The public feedback period will extend to October 3. ■

LABOUR UPDATE



LABOUR MARKET INFORMATION

Alberta's seasonally adjusted unemployment rate was 4.8 per cent in August 2013, up 0.3 percentage points from July and up 0.4 percentage points from the same month last year. This rate was the second lowest in Canada, behind Saskatchewan's 4.2 per cent. The national rate was 7.1 per cent, down 0.1 percentage points from the previous month. The unemployment rate increased because the labour force increased by 22,300 people, and employment increased by 15,200 from July to August 2013.

Seasonally adjusted employment in the forestry, fishing, mining, and oil and gas industries increased by 6,600 from July to August of 2013.

Strong interprovincial and international migration gave Alberta the largest population growth in Canada for the sixth consecutive quarter. As of April 1, Alberta's population was an estimated 3,965,339, an increase of about 34,000 residents over the first three months of 2013. This increase includes 13,438 interprovincial migrants and 8,084 international migrants.

CHANGES TO THE ALBERTA IMMIGRANT NOMINEE PROGRAM (AINP)

Strategic Recruitment Stream—New Post-Graduate Worker Category

International graduates can now apply without needing an employer-supported application. Applicants must be currently working in Alberta, have a current and valid post-graduation work permit and their occupation must be an eligible National Occupational Classification 0, A, B or C skill level, among other requirements.

See the Post-Graduate Worker Category AINP page for details.

Alberta Work Experience Category

More skilled and semi-skilled occupations have been added, including optional trades. Experience criteria has also been streamlined for all eligible occupations.

See the Alberta Work Experience Category AINP page for details.

Employer-Driven Stream

Criteria has been streamlined for:

- International graduates;
- Managers/supervisors in the service, retail and food service industries; and
- Plasterers, drywallers and upholsterers.

See the International Graduate Category AINP page and Skilled Worker Category AINP page for details.

CHANGES TO THE TEMPORARY FOREIGN WORKER PROGRAM

The Government of Canada implemented several changes to the Temporary Foreign Worker (TFW) program including: a fee for labour market opinion (LMO) processing, language restriction, and new advertising requirements and additional questions on the LMO application.

EXTENSION OF THE OCCUPATION-SPECIFIC PILOT

Under the occupation-specific pilot project, as part of the Temporary Foreign Worker Annex agreement, recruiting for some occupations does not require an LMO. The application deadline for this pilot program has been extended.

EXPEDITED PROCESSING AND CREDENTIAL RECOGNITION FOR INTERNATIONAL TRADE WORKERS

Alberta Apprenticeship and Industry Training now recognizes five U.S.-earned trade credentials as equivalent to the corresponding Alberta Trade Certificates. Two Irish trade credentials will also be recognized as equivalent to an Alberta trade certificate. Additionally, 10 Irish trade credentials now qualify for expedited assessment in the Qualification Certificate Program.

CONSTRUCTION JOB EXPO

The Western Canada Construction Job Expo is a chance for employers in the construction sector to meet pre-screened, high-quality job seekers at two invitation-only events in Ireland. These events are custom built by Canadian construction associations to serve the specific employment needs of the industry.

U.K. MARKET FACT SHEET

Are you recruiting internationally but have no idea where to start? The United Kingdom recruiting fact sheet provides information on the labour supply, migration trends, credential recognition and recruitment tips for top international labour pools to help you make informed recruitment decisions.

Contact Us:

Contact us for questions, concerns or more information at EAE.findlabour@gov.ab.ca. ■

PHOTO: Suncor Energy

What's new in the oil sands

BUSINESS

Athabasca Oil Corporation has filed for approval to expand its Hangingstone steam assisted gravity drainage project to 82,000 barrels per day, with the potential to recover an estimated one billion barrels of bitumen over the project's 40-year life. The project's 12,000-barrel-per-day first phase is currently under construction.

If approved, the expansion will consist of two phases, Hangingstone 2 and Hangingstone 3. Construction is scheduled to begin in the second quarter of 2015, with first steam at the expansion expected in 2017 at the second phase and 2018 at the third phase.

Shell Canada Energy has been granted conditional approval from a Joint Review Panel to proceed with the Jackpine Mine expansion, although the panel noted the project will have "significant" adverse environmental effects.

The project would also provide "significant" economic benefits for the region, Alberta and Canada, the panel noted. Its decision offers conditional Alberta Energy Regulator (AER) approval to the mine expansion, but also includes 22 conditions for Shell and 88 recommendations to the federal and provincial governments.

"Although the panel finds that there would be significant adverse project effects on certain wildlife and vegetation, under its authority as the AER, the panel considers these effects to be justified and that the project is in the public interest," the decision said.

The project, to be located about 70 kilometres north of Fort McMurray on the east side of the Athabasca River, would increase bitumen production by 100,000 barrels per day, bringing production at the mine to 300,000 barrels per day.

Pengrowth Energy Corporation has received regulatory approval for the 12,500-barrel-per-day first commercial phase of its Lindbergh thermal project.

Civil construction work on the $590-million project is now expected to begin this year. In September, the company plans to begin drilling 23 well pairs, and first steam is scheduled for the fourth quarter of 2014.

Laricina Energy Ltd. has started operations at its Germain steam assisted gravity drainage project and is moving ahead with the commercial phase of its Saleski project following Alberta government approval.

"The Germain [project] is the first commercial-scale development we have undertaken, and start up is a historic moment for Laricina," said Glen Schmidt, the company's president and chief executive officer.

Located in the west Athabasca region, the $410-million Germain project commenced steam injection in June. First bitumen production is expected in the third quarter of this year. When the project achieves sustained production in 12-18 months, it will be producing 5,000 barrels per day, the company estimated.

At the same time, the 10,700-barrel-per-day first phase of the Saleski project has received provincial government approval to proceed. The $520-million project, located 100 kilometres southwest of Fort McMurray, is expected to begin production late in 2015.

Savanna Energy Services Corp. and Fort McKay First Nation have agreed to form Fort McKay Savanna Energy Services Limited Partnership.

The jointly owned company will provide a range of services to the oil sands sector, including drilling, coring and well servicing, in addition to offering equipment rentals in the Regional Municipality of Wood Buffalo area.

"This partnership is an excellent opportunity for Fort McKay to grow and be active in providing new services to an ever-changing and progressive region," said Fort McKay Chief Jim Boucher. "Fort McKay is looking to diversify its business holdings, particularly in the burgeoning SAGD [steam assisted gravity drainage] mining industry."

Savanna will manage the partnership through its subsidiary, Savanna Drilling.

Sunshine Oilsands Ltd. has received Alberta cabinet approval for its Thickwood in situ oil sands project, but it will not proceed until the company has obtained additional financing.

The next step is to receive final approval from the Alberta Energy Regulator.

The project schedule for Thickwood, Sunshine's second steam assisted gravity drainage commercial development, is under development. Planned capacity is 70,000 barrels per day by 2021.

The company also says it is looking to secure financing of up to $300 million so it can continue to advance its projects. ■

What's new in the oil sands

TECHNOLOGY

■ The Canadian Oil Sands Network for Research and Development (CONRAD) is shutting its doors after nearly two decades of operations. The organization was dissolved at the end of May.

Canada's Oil Sands Innovation Alliance will take over CONRAD's environmental activities, such as the Oil Sands Tailings Consortium and the Environmental and Reclamation Research Group. Non-environmental activities, such as the Froth Treatment Consortium and the Bitumen Production Fundamentals Research Group, will be handled by the Petroleum Technology Alliance of Canada.

■ Southern Pacific Resource Corp. has completed a high-pressure steam stimulation (HPSS) test at one of the 12 well pairs at its STP-McKay project.

Production at the steam assisted gravity drainage (SAGD) project has been slow to ramp up, largely due to difficulties in establishing horizontal communication between several injector and producer wells. The test was intended to reduce the time needed to bring the well pairs to conformance.

Results from the May test are being evaluated, but the company described the initial results as "very encouraging." Since the test, production at the well pair has improved to 750 barrels per day of fluid, with 25 per cent of that being oil. Prior to HPSS, the well pair had not been steadily operating in SAGD mode.

Southern Pacific has filed an application to conduct HPSS on the remaining wells on the first pad at STP-McKay over the summer.

■ Sunshine Oilsands Ltd. will use GE Corporation's evaporator system to recycle most of the waste water produced at the West Ells project, which is nearing first steam at its 5,000-barrel-per-day first phase.

The system is expected to recycle 98 per cent of the waste water produced by the steam assisted gravity drainage project. The treated waste water will be usable as feedwater for conventional drum boilers.

The evaporator system for the first phase is currently being installed, while delivery of the system for the project's 5,000-barrel-per-day second phase is expected in December 2013. First steam at the project is scheduled for mid-2013.

■ Schlumberger Limited has acquired Calgary-based Gushor Inc., a petroleum geochemistry and fluid analysis company working in the heavy oil and oil sands sector.

Formed in 2006, Gushor is a University of Calgary spinoff company focused on production optimization efforts integrating geology, fluid properties, petroleum geochemistry and reservoir engineering information. It has worked on over 300 oil and gas projects around the world.

"The addition of Gushor will enable us to better support our E&P [exploration and production] customers by complementing our leading fluids and rocks technology portfolio with geochemical and fluid property analysis capabilities," said Sameh Hanna, Schlumberger's president of testing services.

■ IDE Technologies Ltd. and Clean Harbors Inc. are partnering in a joint research and development program involving mechanical vapour compression (MVC) evaporators to treat produced water in oil sands operations. The project will focus on improving the reliability of MVC evaporators by combining IDE's horizontal evaporator design with Clean Harbors' knowledge of chemical development and cleaning procedures.

"Treatment of Alberta's oil sands-produced water is challenging because of the high scaling and fouling potential, as well as occasional process excursions," said Chris Porter, senior vice-president of Canadian industrial services at Clean Harbors. "MVC evaporators are a critical step in the water treatment process, as they provide boiler feed water quality."

Using IDE's modular horizontal falling film evaporation technology, the project will look at ways to make treating produced water at steam assisted gravity drainage operations more reliable, energy efficient and cost effective. The MVC evaporator will also include an embedded clean-in-place system for both descaling and fouling removal on internal tube bundles. ■

PHOTO: Cenovus Energy

OIL SANDS PROJECT TECHNOLOGY GUIDE

CSS—CYCLIC STEAM STIMULATION

CSS involves injecting high-pressure steam into the reservoir for several weeks, followed by several weeks where the reservoir is left to "soak." The heat softens the bitumen and the water dilutes and separates the bitumen from the sand. The pressure creates cracks and openings through which the bitumen can flow back into the steam injector wells, which are converted to production mode.

ET-DSP—ELECTRO-THERMAL DYNAMIC STRIPPING

ET-DSP combines the majority of the dominant heat transfer mechanisms to heat and mobilize bitumen in situ. Electrodes are placed in a grid configuration and a production well is located within the centre of each series of electrode wells. The technology has been commercially applied for soil remediation and is expected to reduce greenhouse gas emissions and water use.

N-SOLV

N-Solv involves the injection of pure, heated solvent vapour into an oil sands reservoir where it condenses, delivering heat to the reservoir and subsequently dissolving the bitumen, with the resulting miscible liquids flowing by gravity to a production well. It is designed to accelerate extraction rates and reduce greenhouse gas emissions.

PRIMARY PRODUCTION—COLD HEAVY OIL PRODUCTION WITH SAND

Cold heavy oil production with sand (CHOPS) is a non-thermal in situ primary production technology that involves the continuous production of sand using progressing cavity pumps to enhance recovery.

SAGD—STEAM ASSISTED GRAVITY DRAINAGE

SAGD employs two parallel horizontal wells: one injection well near the top of the reservoir, through which high-pressure steam is continuously injected, and one production well near the bottom of the reservoir into which the softened bitumen continuously flows and can be pumped to the surface. SAGD surface facilities include steam generation, water processing and bitumen treatment. Multiple operators are also now working with solvent co-injection in SAGD to increase recovery and reduce natural gas and water requirements.

SURFACE MINING

Integrated oil sands mining operations accomplish three main functions: mining the oil sands, separating the bitumen from the sand and upgrading the bitumen so refiners can work with it.

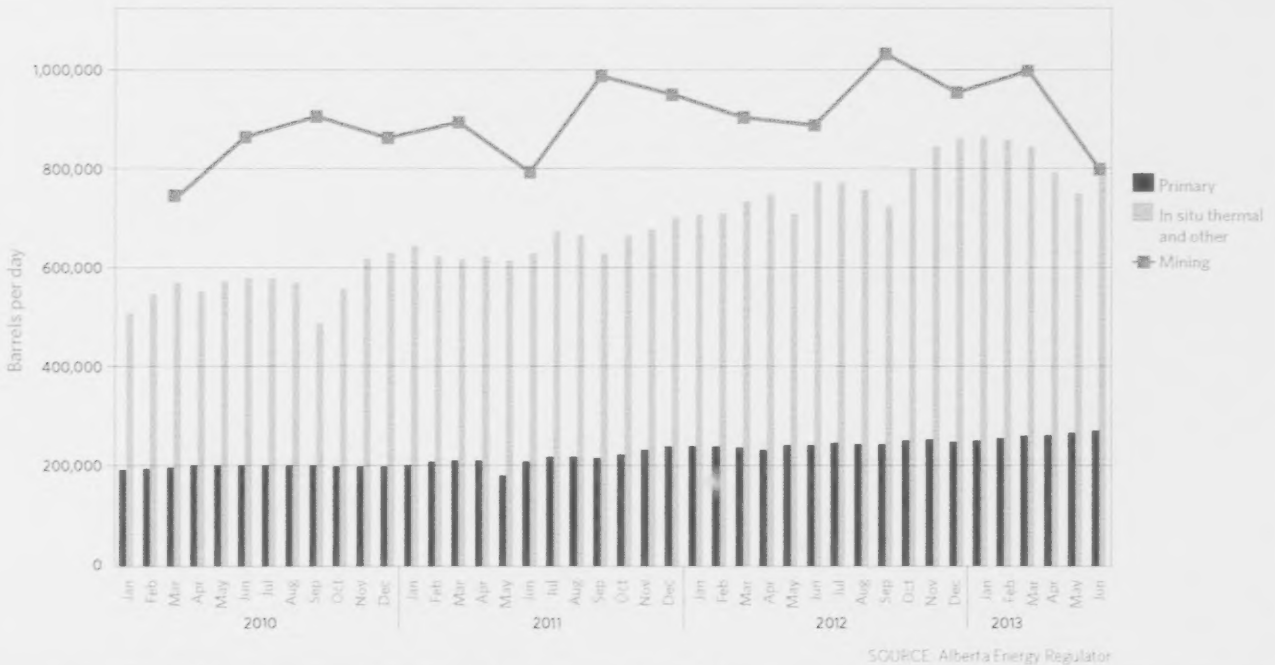
TAGD—THERMAL ASSISTED GRAVITY DRAINAGE

TAGD is a process being developed for the in situ recovery of bitumen from carbonate formations. TAGD uses an array of downhole heaters installed in horizontal wells to heat the reservoir via thermal conduction.

THAI—TOE TO HEEL AIR INJECTION

THAI uses a vertical air injection well with a horizontal production well. Rather than steam, THAI technology injects air and then relies on underground combustion of a portion of the oil in the ground to generate the heat required to melt the remainder of the bitumen and allow it to flow into the production well. The process is intended to reduce greenhouse gas emissions and water use.

Alberta Oil Sands Production by Extraction Method



SOURCE: Alberta Energy Regulator

Project listings

Updated status of oil sands projects in Alberta As of September 2013

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS
NORTH ATHABASCA REGION — MINING			
CANADIAN NATURAL RESOURCES LIMITED			
Horizon			
Canadian Natural says that Horizon reliability continues to improve after completion of the project's first major maintenance turnaround in May. June and July synthetic crude oil production was 101,000 and 110,000 barrels per day, respectively.			
Phase 1	135,000	2009	Operating
Reliability Tranche 2	5,000	2014	Construction
Phase 2A	10,000	2015	Construction
Phase 2B	45,000	2016	Construction
Phase 3	80,000	2017	Construction
IMPERIAL OIL LIMITED			
Kearl			
Imperial Oil says production ramp up continues, line-fill operations are advanced and diluted bitumen sales are expected to begin in the third quarter. The company expects to reach full capacity later in 2013. The Kearl expansion is about 43 per cent complete and remains on track for start up in 2015.			
Phase 1	110,000	2013	Operating
Phase 2	110,000	2015	Construction
Phase 3	80,000	2020	Approved
Phase 4 Debottleneck	45,000	TBD	Approved
SHELL ALBIAN SANDS			
Jackpine			
The federal joint review panel has issued conditional approval despite "significant" environmental impacts. Now the project will go through the Alberta regulatory process and obtain approval from the federal environment minister.			
Phase 1A	100,000	2010	Operating
Phase 1B	100,000	TBD	Approved
Expansion	100,000	2017	Approved
Muskeg River			
Minority partner Marathon Oil Corporation is reporting reduced synthetic crude oil production during the second quarter due to a planned turnaround and unplanned mine downtime.			
Commercial	155,000	2002	Operating
Expansion & Debottlenecking	115,000	TBD	Suspended
Pierre River			
A joint review panel of the Canadian Environmental Assessment Agency and Alberta Energy Regulator is expected to submit its report on the Pierre River project by the end of 2013.			
Phase 1	100,000	2018	Application
Phase 2	100,000	TBD	Application
SUNCOR ENERGY INC.			
Base Operations			
Suncor says production was impacted during the second quarter as a result of a planned turnaround at Upgrader 1 and unplanned third-party outages. Suncor worked to mitigate the impact using existing storage capacity and continuing to transport product on its proprietary pipeline. Following these events, production has been restored and the company is reporting strong performance. The next major turnaround is expected to happen in 2016 at Upgrader 2.			
Millennium Mine	294,000	1967	Operating
Steepbank Debottleneck Phase 3	4,000	2007	Operating
Millennium Debottlenecking	23,000	2008	Operating
North Steepbank Extension	180,000	2012	Operating
Fort Hills			
A sanction decision on Fort Hills is expected in the second half of 2013.			
Phase 1	165,000	2017	Approved
Debottleneck	25,000	TBD	Approved
Voyageur South			
Suncor considers Voyageur South to be a "longer term" project and has not confirmed a start-up date.			
Phase 1	120,000	TBD	Application
SYNCRUDE CANADA LTD.			
Mildred Lake/Aurora			
Canadian Oil Sands Limited says production at Syncrude increased 14 per cent in the second quarter over the previous year, but was lower than expected, primarily due to a coker turnaround in June and unplanned outages in extraction units.			
Base Mine Stage 1 & 2 Expansion	290,700	1978	Operating
Stage 3 Expansion	116,300	2006	Operating
Aurora South Train 1	100,000	2016	Approved
Aurora South Train 2	100,000	2018	Approved

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS
TECK RESOURCES LIMITED			
Frontier			
The Canadian Environmental Assessment Agency estimates the federal review schedule for the project application to be approximately two years, so 2015 would be the earliest approval would be granted. During the first quarter of 2013, Teck says a field exploration program was completed to acquire additional geotechnical information to support future engineering studies.			
Phase 1	94,600	2021	Application
Phase 2	84,000	2024	Application
Phase 3	79,300	2027	Application
Phase 4 Equinox	39,400	2030	Application
TOTAL E&P CANADA LTD.			
Joslyn North Mine			
Project partner Suncor Energy Inc. says an updated timing for the Joslyn sanction decision will be made available when it is ready.			
Phase 1	100,000	2021	Approved
NORTH ATHABASCA REGION — IN SITU			
ATHABASCA OIL CORPORATION			
Birch			
Athabasca Oil says that capital expenditures related to Birch in the first quarter related primarily to regulatory compliance activities and preliminary engineering on future site access infrastructure. The company says it continues to prepare its regulatory application (expected to be filed in 2013) and is still reviewing the optimum size of the first phase.			
Phase 1	12,000	TBD	Application
Dover West Carbonates (Leduc)			
Athabasca Oil says it has completed the third production cycle of the Dover West carbonates TAGD test, and the results have successfully met or exceeded all design objectives, which included demonstrating the ability to heat the reservoir with thermal conduction and produce bitumen by gravity drainage from the Leduc carbonate formation.			
Phase 1 Demonstration	6,000	2015	Application
Phase 2 Demonstration	6,000	TBD	Application
Dover West Sands & Clastics			
Athabasca Oil is currently awaiting regulatory approval for the Dover West Sands Phase 1.			
Phase 1	12,000	2015	Application
Phase 2	35,000	2018	Announced
Phase 3	35,000	2020	Announced
Phase 4	35,000	2022	Announced
Phase 5	35,000	2024	Announced
BP P.L.C.			
Terre de Grace			
BP says that ongoing appraisal activities include delineation drilling, seismic acquisition and appraisal of water sources.			
Pilot	10,000	TBD	Approved
BRION ENERGY CORPORATION			
Dover			
The Alberta Energy Regulator has approved the Dover project without including the development buffer zone requested by the Fort McKay First Nation. Final approval from Alberta Environment and formal Order in Council pending.			
Dover North Phase 1	50,000	2016	Approved
Dover North Phase 2	50,000	2018	Approved
Dover South Phase 3	50,000	2020	Approved
Dover South Phase 4	50,000	2022	Approved
Dover South Phase 5	50,000	2024	Approved
MacKay River			
Phase 1	35,000	2015	Constructing
Phase 2	40,000	2018	Approved
Phase 3	40,000	2020	Approved
Phase 4	35,000	2022	Approved
CANADIAN NATURAL RESOURCES LIMITED			
Birch Mountain			
Canadian Natural says Birch is in the planning stages.			
Phase 1	60,000	2019	Announced
Phase 2	60,000	2023	Announced
CENOVUS ENERGY INC.			
East McMurray			
Phase 1	30,000	TBD	Proposed
Steepbank			
Phase 1	30,000	TBD	Proposed

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS
Telephone Lake			
Cenovus says its dewatering pilot continues and has been running as expected with positive results. Approximately 50 per cent of the water—which is sitting on top of the oil sands deposit—has been displaced and replaced by air. Cenovus plans to complete this pilot in the fourth quarter. Regulatory approval for commercial development in 2014.			
Phase A	45,000	TBD	Application
Phase B	45,000	TBD	Application
E-T ENERGY LTD.			
Poplar Creek			
The Alberta government has announced it will cancel several oil sands leases surrounding Fort McMurray in order to enable community growth. E-T Energy is one of the companies that is impacted. It is also advertising that it is interested in an outright sale, joint venture, farm-in or takeover of its Poplar Creek asset. The management team says the next phase of the project will work with an investment of $35 million.			
Experimental Pilot	1,000	2007	Operating
Phase 1	10,000	TBD	Announced
Phase 2	40,000	TBD	Announced
GRIZZLY OIL SANDS ULC			
Thickwood			
Grizzly filed the regulatory application for the Thickwood project in December 2012.			
Phase 1	6,000	2017	Application
Phase 2	6,000	TBD	Application
HUSKY ENERGY INC.			
Saleski			
Husky filed the regulatory application for its Saleski pilot in early May 2013.			
Carbonate Pilot	3,000	2017	Application
Sunrise			
Husky says Phase 1 at Sunrise is approximately 70 per cent complete and on track for first production in 2014. The central processing facility is 60 per cent complete with all critical modules delivered and equipment for Plant 1A installed. Field facilities are approximately 95 per cent complete, all pipelines are complete and the first well pad is being commissioned. All well pads are targeted to be complete by the end of 2013. To date, Husky says more than two-thirds of the total cost estimate has been spent. A design basis memorandum has been completed for the next phase of development, and work continues toward the FEED phase.			
Phase 1	60,000	2014	Construction
Phase 2	50,000	2016	Approved
Phase 3	50,000	2019	Application
Phase 4	50,000	TBD	Application
IMPERIAL OIL LIMITED			
Aspen			
Imperial Oil has filed the proposed terms of reference for the Aspen project's environmental impact assessment with Alberta Environment. Public review and comment will be accepted until October.			
Phase 1	45,000	TBD	Announced
Phase 2	45,000	TBD	Announced
Phase 3	45,000	TBD	Announced
IVANHOE ENERGY INC.			
Tamarack			
Ivanhoe Energy has received a letter of non-objection from the Makaw Cree First Nation regarding the Tamarack project. The company says it has now successfully secured letters of non-objection from five of the seven stakeholders that filed statements of concern and continues efforts to resolve the final two statements of concern.			
Phase 1	20,000	2016	Application
Phase 2	20,000	TBD	Application
MARATHON OIL CORPORATION			
Birchwood			
Marathon filed its regulatory application in 2012. Regulatory approval and project sanctioning are expected in 2013.			
Demonstration	12,000	2017	Application
OAK POINT ENERGY LTD.			
Lewis			
The AER and Alberta Environment have approved Oak Point's Lewis project, which is estimated to cost $65 million.			
Pilot	1,720	TBD	Approved
SILVERWILLOW ENERGY CORPORATION			
Audet			
SilverWillow says the design basis memorandum for its 12,000 barrel-per-day project is nearing completion. In the near term, the company says it will continue environmental baseline studies, prepare and submit its regulatory application, and determine requirements for pilot tests to confirm caprock integrity.			
Pilot	12,000	2016	Announced
SOUTHERN PACIFIC RESOURCE CORP.			
STP-McKay			
Southern Pacific says production at STP-McKay increased 16 per cent in June over the previous month, averaging 1,187 barrels per day. A single well pair was treated with high-pressure steam stimulation in late May in order to improve communication between injector and producer. This appears to have been successful and Southern Pacific has applied to perform this on the remaining five wells on Pad 101.			
Phase 1	12,000	2012	Operating
Phase 1 Expansion	6,000	2015	Application
Phase 2A	12,000	2017	Application
Phase 2B	6,000	2012	Application
SUNCOR ENERGY INC.			
Dover			
Operations commenced at the N-Solv pilot in December 2012. Solvent injection and first oil is expected in May 2013. Operations will continue until 2015.			
Demonstration Plant	500	2013	Construction

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS
Firebag			
In mid-August, Firebag production was reported at approximately 160,000 barrels per day, due to ramp-up of Stage 4. Suncor anticipates the project will reach full design capacity of 180,000 barrels per day early in 2014.			
Stage 1	35,000	2004	Operating
Stage 2	35,000	2006	Operating
Cogeneration and Expansion	25,000	2007	Operating
Stage 3	42,500	2011	Operating
Stage 4	42,500	2012	Operating
Stage 5	62,500	2018	Approved
Stage 6	62,500	2019	Approved
Stage 3-6 Debottleneck	23,000	TBD	Application
Lewis			
After the MacKay River expansion and debottlenecking at both Firebag and MacKay River, Lewis is expected to be Suncor's next area of in situ development focus.			
Phase 1	40,000	TBD	Announced
Phase 2	40,000	TBD	Announced
MacKay River			
Suncor continues to move toward a 2014 junction for the MacKay River expansion and in the meantime expects to increase production by approximately 20 per cent over the next two years through debottlenecking.			
Phase 1	33,000	2002	Operating
Debottleneck	5,000	TBD	Construction
MR2	20,000	2017	Application
SUNSHINE OILSANDS LTD.			
Harper			
Carbonate Pilot	1,000	TBD	Operating
Legend Lake			
Sunshine says regulatory approval for the first 10,000-barrel-per-day phase is expected later in 2013. The company is completing field work for its environmental analysis, which will support work for significant commercial expansion.			
Phase A1	10,000	2016	Application
Phase A2	30,000	TBD	Announced
Phase B	30,000	TBD	Announced
Phase B2	30,000	TBD	Announced
Thickwood			
Sunshine says regulatory approval is anticipated in the first half of 2013. The company is completing field work for its environmental analysis, which will support plans for significant commercial expansion.			
Phase A1	10,000	2015	Application
Phase A2	30,000	2017	Announced
Phase B	30,000	2021	Announced
West Ells			
Sunshine says that some of the work on the West Ells site has been slowed down temporarily as the company seeks additional funding.			
Phase A1	5,000	2014	Construction
Phase A2	5,000	2014	Approved
Phase A3	30,000	2018	Announced
Phase B	20,000	2025	Announced
Phase C1	30,000	TBD	Announced
Phase C2	30,000	TBD	Announced
SOUTH ATHABASCA REGION — IN SITU			
ALBERTA OILSANDS INC.			
Clearwater West			
The Alberta government has announced it will cancel several oil sands leases surrounding Fort McMurray in order to allow for community growth, including those associated with Alberta Oilsands' Clearwater project. Compensation will include lease licence and application fees, sunk-cost exploration and development expenditures, reclamation costs and interest of five per cent. Alberta Oilsands says it has spent approximately $51 million in the acquisition and development of Clearwater.			
Phase 1 Pilot	4,350	TBD	Application
Phase 2	25,000	2016	Announced
ATHABASCA OIL CORPORATION			
Hangingstone			
Athabasca Oil Corporation has filed the regulatory application for a phased expansion at Hangingstone to 82,000 barrels per day. Field construction on the 12,000-barrel-per-day first phase is underway.			
Phase 1	12,000	2014	Construction
Phase 2	40,000	2017	Application
Phase 3	35,000	2018	Application
BLACKPEARL RESOURCES INC.			
Blackrod			
BlackPearl says that recent operating adjustments have resulted in solid SAGD pilot performance, with June production in excess of 600 barrels per day. The second pilot well pair has been drilled and BlackPearl expects to begin steaming later this year. The regulatory process continues for approval of the first commercial phase.			
Pilot	800	2011	Operating
Phase 1	20,000	2015	Application
Phase 2	30,000	2018	Application
Phase 3	30,000	2021	Application

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS
CANADIAN NATURAL RESOURCES LIMITED			
Gregoire Lake			
Canadian Natural says Gregoire Lake is in the planning stages.			
Phase 1	60,000	TBD	Announced
Phase 2	60,000	TBD	Announced
Grouse			
Canadian Natural says Grouse is in the planning stages. First production is expected between 2017 and 2019.			
Commercial	50,000	TBD	Application
Kirby North			
Canadian Natural says detailed engineering is progressing. As of June 30, the engineering portion was 64 per cent complete. Construction of the main access road has been completed and initial site preparation continues in the third quarter.			
Phase 1	40,000	2016	Construction
Phase 2	60,000	2023	Application
Kirby South			
Canadian Natural says Kirby South is ahead of plan and on budget. Drilling was successfully completed on the seventh and final pad during the second quarter. Commissioning is nearing completion, with steam injection to commence imminently.			
Phase 1	40,000	2013	Construction
Phase 2	20,000	2020	Application
CAVALIER ENERGY INC.			
Hoole			
Cavalier expects the first phase at Hoole to cost between $450 million and $475 million. The company continues FEED work for the first 10,000 barrel-per-day phase at Hoole, along with geotechnical work and drilling additional source water and disposal wells. The company anticipates regulatory approvals by mid-2014 and continues to evaluate funding alternatives.			
Phase 1	10,000	2017	Application
Phase 2	35,000	TBD	Announced
Phase 3	35,000	TBD	Announced
CENOVUS ENERGY INC.			
Christina Lake			
Cenovus says steam injection at Phase E started in June, with first production achieved in mid-July, with ramp-up to 40,000-barrel-per-day capacity in six to nine months, similar to Phase D. Procurement, plant construction and major equipment fabrication continue for Phase F, which is now about 30 per cent complete. Engineering work continues for Phase G.			
Phase 1A	10,000	2002	Operating
Phase 1B	8,800	2008	Operating
Phase C	40,000	2011	Operating
Phase D	40,000	2012	Operating
Phase E	40,000	2013	Construction
Phase F	50,000	2016	Construction
Phase G	50,000	2017	Approved
Phase H	50,000	2019	Application
Optimization (Phases C, D, E)	22,000	2015	Application
Foster Creek			
Cenovus says that plant construction for the combined F, G and H expansion is approximately 60 per cent complete. The central plant for Phase F is about 78 per cent complete and first production is expected in the third quarter of 2016. Pipe rack and equipment module assembly are essentially complete for Phase G, and piling work was completed in May. Overall, Phase G is about 56 per cent complete, with initial production expected in 2017. At Phase H, site preparation, piling work and major equipment procurement continue to progress as planned.			
Phase A	24,000	2001	Operating
Phase B Debottleneck	6,000	2003	Operating
Phase C, Stage 1	10,000	2005	Operating
Phase C, Stage 2	20,000	2007	Operating
Phase D	30,000	2009	Operating
Phase E	30,000	2009	Operating
Phase F	45,000	2014	Construction
Phase G	40,000	2015	Construction
Phase H	40,000	2016	Construction
Phase J	50,000	2019	Application
Future Optimization	15,000	TBD	Announced
Grand Rapids			
Cenovus is planning minor facility upgrades at the Grand Rapids pilot in the third quarter, which are expected to help increase production from the two operational well pairs. Regulatory approval for the commercial project is anticipated by the end of 2015.			
Pilot	600	2011	Operating
Phase A	60,000	2017	Application
Phase B	60,000	TBD	Application
Phase C	60,000	TBD	Application
Narrows Lake			
Cenovus says that site preparation, engineering and procurement are progressing as expected. Construction of the Phase A plant is scheduled to start later in the third quarter.			
Phase A	45,000	2017	Construction
Phase B	45,000	TBD	Approved
Phase C	40,000	TBD	Approved
West Kirby			
Phase 1	30,000	TBD	Announced

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS
Winefred Lake			
Phase 1	10,000	TBD	Announced
CNOOC LIMITED			
Long Lake			
CNOOC oil and gas output jumped 23.1 per cent in the first half of 2013, thanks in part to Canadian subsidiary Nexen Inc., which produces about 30,000 barrels per day from Long Lake, as well as volumes from several conventional properties. The Phase A plant is scheduled to start later in the third quarter.			
Phase 1	72,000	2008	Operating
Phase 2	72,000	TBD	Approved
Phase 3	72,000	TBD	Application
Phase 4	72,000	TBD	Announced
Long Lake South (Kinosis) Phase 1	40,000	TBD	Approved
Long Lake South (Kinosis) Phase 2	40,000	TBD	Approved
CONNACHER OIL AND GAS LIMITED			
Great Divide			
Connacher completed its 2013 drilling program in the second quarter, consisting of four infill wells on one pad and four new well pairs on another. Construction of associated surface facilities and tie-ins continues. Steaming of the new well pairs is expected to begin at the end of the third quarter, with conversion to production expected by the end of the fourth quarter. Steaming of the first of the infill wells began in the second quarter, and production is expected from all four by the end of the fourth quarter. The SAGD+ trial (which Connacher says has increased production rates by 30 per cent in the first four months of 2013 compared to the first four months of 2012) is ongoing. The company is also working to reduce the amount of diluent in its dilbit.			
Pod One	10,000	2007	Operating
Algar	10,000	2010	Operating
Expansion 1A	12,000	TBD	Approved
Expansion 1B	12,000	TBD	Approved
CONOCOPHILLIPS CANADA			
Surmont			
ConocoPhillips continues to seek buyers for a significant portion of its oil sands leases and operations, including its 50 per cent stake in the Surmont project. The company says this process will extend into 2014.			
Pilot	1,200	1997	Operating
Phase 1	27,000	2007	Operating
Phase 2	109,000	2015	Construction
DEVON CANADA CORPORATION			
Jackfish			
Devon says production at Jackfish continues to achieve record rates, averaging 54,000 barrels per day in the first quarter of 2013, an 18 per cent increase over the first quarter of 2012. Construction on Jackfish 3 is approximately 60 per cent complete.			
Phase 1	35,000	2007	Operating
Phase 2	35,000	2011	Operating
Phase 3	35,000	2015	Construction
Jackfish East			
Expansion	20,000	2018	Announced
Pike			
Devon says the Pike project continues to move through the regulatory process.			
1A	35,000	2016	Application
1B	35,000	2017	Application
1C	35,000	2018	Application
GRIZZLY OIL SANDS ULC			
Algar Lake			
Grizzly has begun commissioning the Algar Lake project and expects first production during the third quarter of 2013. Grizzly has announced more details on its inventory of future development featuring six additional projects, including one in bitumen carbonates.			
Phase 1	5,500	2013	Construction
Phase 2	5,500	2014	Approved
May River			
Grizzly says it has completed a 29-well delineation drilling program. Corporate part-owner Gulfport Energy says the company continues to work toward filing regulatory applications for a 12,000-barrel-per-day SAGD project at May River by the end of 2013.			
Phase 1	6,800	TBD	Announced
Phase 2	6,800	TBD	Announced
HARVEST OPERATIONS CORP.			
BlackGold			
During the first half of 2013, Harvest says it invested $162.7 million toward construction of the central processing facility, which is being developed under an EPC contract totalling $520 million. At the end of June 2013, the EPC contract was 80 per cent complete.			
Phase 1	10,000	2014	Construction
Phase 2	20,000	TBD	Approved
HUSKY ENERGY INC.			
McMullen			
Husky says that during the second quarter, drilling and completions activities for cold production at McMullen continued. Three wells were drilled and eight slant development wells, which were drilled in the first quarter, were put on production. At the air injection pilot, ongoing testing and monitoring of the horizontal production wells continued as planned. Husky has also filed an amendment application to the Alberta Energy Regulator to allow the remaining three horizontal wells to be brought on production later in the year.			
Air Injection Pilot: Experimental	755	2012	Operating
JAPAN CANADA OIL SANDS LIMITED			
Hangingstone			
Site clearing and civil work began in February 2013. Drilling of first horizontal well pairs to begin in August.			
Expansion	20,000	2016	Approved

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS
Hangingstone Pilot			
Pilot	11,000	1999	Operating
KOCH EXPLORATION CANADA CORPORATION			
Muskwa			
The Alberta government has announced it will cancel several oil sands leases surrounding Fort McMurray to enable community growth. Koch is one of the companies that is affected.			
Pilot	10,000	2015	Application
LANCINA ENERGY LTD.			
Germain			
Steaming has commenced at the Germain SAGD project, with first production expected to follow later in the fall. This is Lancina Energy's first commercial scale oil sands installation.			
Phase 1 CDP	5,000	2013	Construction
Phase 2	30,000	2016	Application
Phase 3	60,000	TBD	Application
Phase 4	60,000	TBD	Application
Saleski			
Lancina has received regulatory approval for the first commercial phase at Saleski, which it says is a critical next step for the industry and the province in the development of the bitumen carbonates, a massive untapped resource. Lancina is also one of the companies that will be impacted by the Government of Alberta's recent announcement that it will cancel several oil sands leases surrounding Fort McMurray to enable community development, though this does not impact Saleski or Germain.			
Experimental Pilot	1,800	2011	Operating
Phase 1	10,700	2015	Application
Phase 2	30,000	2017	Announced
Phase 3	60,000	2020	Announced
Phase 4	60,000	2023	Announced
Phase 5	60,000	2026	Announced
Phase 6	60,000	TBD	Announced
MEG ENERGY CORP.			
Christina Lake			
MEG says that Phase 2B water treatment and steam generation facilities are now mechanically complete and as the commissioning process, with start-up of steaming planned for late in the third quarter. Completion of oil treating facilities and first oil are expected in the fourth quarter.			
Phase 1 Pilot	3,000	2008	Operating
Phase 2A	22,000	2009	Operating
Phase 2B	35,000	2013	Construction
Phase 3A	50,000	2016	Approved
Phase 3B	50,000	2018	Approved
Phase 3C	50,000	2020	Approved
Surmont			
MEG says that so far in 2013 a total of 24 stratigraphic wells, one water source well and three water test wells have been completed at Surmont.			
Phase 1	41,000	TBD	Application
Phase 2	41,000	TBD	Application
Phase 3	41,000	TBD	Application
OSUM OIL SANDS CORP.			
Sepiko Kesik			
Osum says it anticipates regulatory approval for Sepiko Kesik in 2014, requiring financing in 2015/16.			
Phase 1	30,000	2018	Application
Phase 2	30,000	2020	Application
STATOIL CANADA LTD.			
Kai Kos Dehseh			
Project partner PTT Exploration and Production says the FEED concept design, optimization and bidding process for the up to 40,000-barrel-per-day Leismer expansion have been completed. FEED approval is expected during the second quarter. Meanwhile, FEED for the Corner project is ongoing. PTTEP says it is working with Statoil to optimize the design and project investment, which will be completed in the third quarter of 2013 with expected significant cost reduction.			
Leismer Demonstration	10,000	2010	Operating
Corner	40,000	2017	Approved
Leismer Commercial	10,000	TBD	Approved
Leismer Expansion	20,000	TBD	Application
Corner Expansion	40,000	TBD	Application
Hangingstone	20,000	TBD	Application
Leismer Northwest	20,000	TBD	Application
Leismer South	20,000	TBD	Application
Thornbury	40,000	TBD	Application
Thornbury Expansion	20,000	TBD	Application
SUNCOR ENERGY INC.			
Chard			
Phase 1	40,000	TBD	Regulatory
Meadow Creek			
Phase 1	40,000	TBD	Approved
Phase 2	40,000	TBD	Approved
SURMONT ENERGY LTD.			
Wildwood			
Phase 1	12,000	2015	Application

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS
VALUE CREATION INC.			
Advanced TriStar			
Value Creation has submitted an environmental assessment report for the Advanced TriStar project.			
ATS 1	15,000	2016	Application
ATS 2	30,000	2018	Application
ATS 3	30,000	2020	Application
TriStar			
Pilot	1,000	2014	Application
COLD LAKE REGION – IN SITU			
BAYTEX ENERGY CORP.			
Gemini			
Baytex says that construction on the Gemini project (referred to as Angling Lake) is underway. Construction of pilot project facilities began in the second quarter. Construction of the drilling pad is complete, mechanical crews have been mobilized and major equipment is being moved on site. The company expects to drill the SAGD well pair in the third quarter and commence steaming late in 2013 or early in 2014.			
Pilot	1,200	TBD	Construction
Commercial	5,000	2016	Approved
BIRCHWOOD RESOURCES INC.			
Sage			
Birchwood has filed its regulatory application for the $230-million Sage project. Propak Systems of Airdrie, Alta., will execute modular surface facility construction.			
Pilot	5,000	2015	Application
CANADIAN NATURAL RESOURCES LIMITED			
Primrose & Wolf Lake			
Environment Canada has launched an investigation into four separate bitumen emulsion releases at Primrose & Wolf Lake that began earlier this year and continue at minimal rates. The Alberta Energy Regulator and Alberta Environment are also conducting separate investigations.			
Primrose East	32,000	2008	Operating
Primrose North	30,000	2006	Operating
Primrose South	45,000	1985	Operating
Wolf Lake	13,000	1985	Operating
DEVON CANADA CORPORATION			
Walleye			
Devon says the Walleye project has been deferred by a year and will be assessed for inclusion in its 2014 budget.			
Phase 1	9,000	2017	Application
HUSKY ENERGY INC.			
Caribou			
Demonstration	10,000	TBD	Approved
Tucker			
The Alberta Energy Regulator's bitumen production reports are showing Tucker production exceeding a monthly average of 10,000 barrels per day for the first time in March 2013.			
Phase 1	30,000	2006	Operating
IMPERIAL OIL LIMITED			
Cold Lake			
Imperial says that nearly half of the Nabiye expansion modules are on site and drilling operations are underway on the fifth and sixth of the project's seven well pads. The project is 48 per cent complete as of June 30 and on target for late-2014 start-up.			
Phases 1-10	110,000	1985	Operating
Phases 11-13	30,000	2002	Operating
Phases 14-16	40,000	2014	Construction
OSUM OIL SANDS CORP.			
Taiga			
Osum says engineering work is underway and some long-lead items have been ordered. Project sanction is expected in 2013. Financing is required.			
Phase 1	23,000	2015	Approved
Phase 2	22,000	2017	Planning
PENGROWTH ENERGY CORPORATION			
Lindbergh			
Pengrowth has received regulatory approval for the Lindbergh project. Construction is expected to commence during the third quarter, with first steam scheduled for the fourth quarter of 2014. Pengrowth has ordered all major equipment and 60 per cent of minor equipment for the first commercial phase. Process design is 90 per cent complete and mechanical design is 40 per cent complete. Vendor packages have been ordered and skid fabrication has commenced. Engineering and procurement work is on track and civil construction is expected to commence imminently, as is mechanical construction of the CPF and well pair drilling. Pilot performance continues to show strong results.			
Pilot	1,200	2002	Operating
Phase 1	12,500	2015	Under Way
Phase 2	12,500	2017	Announced
Phase 3	20,000	2018	Announced
ROYAL DUTCH SHELL PLC			
Orion			
Shell had previously put up for sale its Orion asset, but says it has not received any offers that reflect its value and has ended sale activities.			
Phase 1	10,000	2007	Operating
Phase 2	10,000	TBD	Proposed

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS
PEACE RIVER REGION — IN SITU			
ANDORA ENERGY CORPORATION			
Sawn Lake			
Andora Energy majority owner Pan Orient Energy says joint-venture partner Deep Well Oil & Gas Ltd. (owner of Northern Alberta Oil Ltd.) has served notice of election to participate in the Sawn Lake demonstration project. Pan Orient says work is proceeding on site preparation, equipment purchases, pipeline installation and drilling preparation. Steam operations are expected to begin in December, with first oil targeted for the first quarter of 2014. The project is budgeted at $28.1 million.			
Demonstration	1,400	2014	Construction
BAYTEX ENERGY CORP.			
Cliffdale			
Baytex says that successful operations continued at its 10-well Cliffdale C-11 module in the second quarter, with bitumen production averaging approximately 800 barrels per day. Facility construction at the new 15-well C-55 module is well underway, and drilling operations have commenced. Plant construction and initiation of cold production is expected in the fourth quarter, with first cycle steaming expected in the first half of 2014.			
Pilot	2,000	2010	Operating
Harmon Valley			
Pilot	TBD	2011	Operating
MURPHY OIL COMPANY LTD.			
Cadotte			
Pilot	TBD	TBD	On Hold
Seal/Cadotte			
Pilot	TBD	TBD	Pre-Application
NORTHERN ALBERTA OIL LTD.			
Sawn Lake			
Company owner Deep Well Oil & Gas says WorleyParsons has been hired preliminary engineering work on the Sawn Lake pilot project. The work will include a pilot plan, process flow diagrams, material balances for hydrocarbons, sulphur and water, descriptions of the capacity and content of emissions.			
Pilot	300	TBD	Pre-Application
PENN WEST PETROLEUM LTD.			
Harmon Valley South			
Penn West says it continues to progress its three well thermal pilot at Harmon Valley South, which is expected to commence steam injection in the second half of 2013.			
Pilot	TBD	TBD	Construction
Seal Main			
Pilot	75	2011	Operating
Commercial	30,000	2015	Application
PETROBANK ENERGY AND RESOURCES LTD.			
Dawson			
Petrobank commenced cold production operations from both horizontal THAI production wells in late 2012 and they produced at a combined rate of approximately 30 barrels per day in the second quarter. The two wells have now been shut in. Petrobank has applied to the Alberta Energy Regulator to initiate cyclic steam stimulation operations on the THAI production wells, which the company says could be more effective in pre-conditioning the reservoir for THAI operations than conventional cold production.			
Experimental THAI Demonstration	10,000	2013	Approved
Phase 2	10,000	TBD	Pre-Application
ROYAL DUTCH SHELL PLC			
Peace River			
Shell has received regulatory approval for the Carmon Creek project, for which it applied more than three years ago. A final investment decision could come this year.			
Cadotte Lake	12,500	1986	Operating
Carmon Creek - Phase 1	40,000	2015	Approved
Carmon Creek - Phase 2	40,000	2018	Approved
SOUTHERN PACIFIC RESOURCE CORP.			
Red Earth			
Southern Pacific says the cyclic steam stimulation pilot at Red Earth is currently shut in.			
Pilot	1,000	2009	On Hold
Pilot Expansion	3,000	TBD	Pre-Application
Commercial	10,000	TBD	Announced
SASKATCHEWAN REGION — IN SITU			
CENOVUS ENERGY INC.			
Axe Lake			
Cenovus Energy acquired the Axe Lake project in fall 2012. The company has not yet announced plans for the asset, stating only that it is a good "bolt-on" addition to the emerging Telephone Lake project, which is adjacent.			
Commercial	30,000	TBD	On Hold
NORTH ATHABASCA REGION — UPGRADER			
BP P.L.C.			
Terre de Grace			
BP says that ongoing appraisal activities include delineation drilling, seismic acquisition and appraisal of water sources.			
Pilot	8,400	TBD	Pre-Application
CANADIAN NATURAL RESOURCES LIMITED			
Horizon			
Canadian Natural says that Horizon reliability continues to improve after completion of the project's first major maintenance turnaround in May. June and July synthetic crude oil production was 111,000, 96,000 and 110,000 barrels per day, respectively.			
Phase 1	114,000	2009	Operating

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS
Horizon continued			
Kirkpatrick Tranche 2	5,000	2014	Construction
Phase 2A	30,000	2015	Construction
Phase 2B	45,000	2016	Construction
Phase 3	80,000	2017	Announced
TWINNOE ENERGY INC.			
Tamarack			
Swan Hills Energy has received a letter of non-objection from the Mikisew Cree First Nation regarding the Tamarack project. The company says it has now successfully secured letters of non-objection from five of the seven stakeholders that filed statements of concern and continues efforts to resolve the final two statements of concern.			
Phase 1	34,784	2016	Application
SUNCOR ENERGY INC.			
Base Operations			
Suncor says production was impacted during the second quarter as a result of a planned turnaround at Upgrader 1 and unplanned third-party outages. Suncor worked to mitigate the impact using existing storage capacity and rail. Owing to transport product on its proprietary pipeline. Following these events, production has been restored and the company is reporting strong performance. The next major turnaround is expected to happen in 2016, at Upgrader 2.			
U1 and U2	225,000	1967	Operating
Millennium Vacuum Unit	35,000	2005	Operating
Millennium Coker Unit	97,000	2008	Operating
Voyageur Upgrader 3			
Suncor has announced it will not proceed with the Voyageur Upgrader. Total is no longer a partner on the project.			
Phase 1	127,000	2016	Cancelled
Phase 2	63,000	TBD	Cancelled
SYNCRUDE CANADA LTD.			
Mildred Lake/Aurora			
Canadian Oil Sands Limited says production at Syncrude increased 14 per cent in the second quarter over the previous year, but was lower than expected, primarily due to a coker turnaround in June and unplanned outages in extraction units.			
Base Plant Stage 1&2 Debottleneck	250,000	1978	Operating
Stage 3 Expansion (U9, 11)	100,000	2006	Operating
Stage 3 Debottleneck	35,000	TBD	Announced
SOUTH ATHABASCA REGION — UPGRADER			
CNOOC LIMITED			
Long Lake			
CNOOC oil and gas output jumped 23.3 per cent in the first half of 2013, thanks in part to Canadian subsidiary Nexen Inc., which produces about 30,000 barrels per day from Long Lake as well as volumes from several other conventional properties.			
Phase 1	58,500	2008	Operating
Phase 2	58,500	TBD	Planning
Phase 3	58,500	TBD	Application
Phase 4	58,500	TBD	Announced
VALUE CREATION INC.			
Advanced TriStar			
Value Creation has submitted an environmental assessment report for the Advanced TriStar project.			
ATS-1	12,750	2016	Application
ATS-2	25,500	2018	Announced
ATS-3	25,500	2020	Announced
TriStar			
Value Creation is one of several companies to be impacted by the Alberta government's pending cancellation of oil sands leases around Fort McMurray.			
Pilot	2,125	2014	Application
INDUSTRIAL HEARTLAND REGION — UPGRADER			
NORTH WEST UPGRADING INC.			
Redwater Upgrader			
The North West Redwater Partnership says that while the owners and EPC teams continue with design and major equipment procurement activities, contractors are active on civil site preparation. Foundation preparation work has commenced for a reaction vessel assembly building, which, starting in summer 2013, will be utilized for final assembly of very heavy vessel segments that will be received at site in early 2014. Following sufficient site grading, work will commence deep underground. Excavation work for process equipment will commence later in 2013.			
Phase 1	50,000	2016	Construction
Phase 2	50,000	TBD	Announced
Phase 3	50,000	TBD	Announced
SHELL ALBIAN SANDS			
Scotford Upgrader 1			
Minority partner Marathon Oil Corporation is reporting reduced synthetic crude oil volumes during the second quarter as a result of a planned turnaround at the Athabasca Oil Sands Project and unplanned maintenance.			
Commercial	155,000	2003	Operating
Expansion	100,000	2011	Operating
VALUE CREATION INC.			
Heartland			
Reports are that Value Creation could be up and running within 18 months of project sanction, but funding remains an issue.			
Phase 1	46,300	TBD	On Hold
Phase 2	46,300	TBD	Announced
Phase 3	46,300	TBD	Announced

GLOSSARY of oil sands terms

Asphaltenes
The heaviest and most concentrated aromatic hydrocarbon fractions of bitumen.

Barrel
The traditional measurement for crude oil volumes. One barrel equals 42 U.S. gallons (159 litres). There are 6.29 barrels in one cubic metre of oil.

Bitumen
Naturally occurring, viscous mixture of hydrocarbons that contain high levels of sulphur and nitrogen compounds. In its natural state, it is not recoverable at a commercial rate through a well because it is too thick to flow. Bitumen typically makes up about 10 per cent by weight of oil sand, but saturation varies.

Cogeneration
The simultaneous production of electricity and steam, which is part of the operations of many oil sands projects.

Coking
An upgrading/refining process used to convert the heaviest fraction of bitumen into lighter hydrocarbons by rejecting carbon as coke. Coking can be either delayed coking (semi-batch) or fluid coking (continuous).

Condensate
Mixture of extremely light hydrocarbons recoverable from gas reservoirs. Condensate is also referred to as a natural gas liquid, and is used as a diluent to reduce bitumen viscosity for pipeline transportation.

Conventional crude oil
Mixture of mainly pentane and heavier hydrocarbons, recoverable at a well from an underground reservoir, and liquid at atmospheric pressure and temperature. Unlike bitumen, it flows through a well without stimulation and through a pipeline without processing or dilution.

Cracking
An upgrading/refining process for converting large, heavy molecules into smaller ones. Cracking processes include fluid cracking and hydrocracking.

Cyclic steam stimulation (CSS)
An in situ production method incorporating cycles of steam injection, steam soaking and oil production. The steam reduces the viscosity of the bitumen and allows it to flow to the production well.

Density
The heaviness of crude oil, indicating the proportion of large, carbon-rich molecules, generally measured in kilograms per cubic metre (kg/m³) or degrees on the American Petroleum Institute (API) gravity scale. In western Canada, oil up to 900 kg/m³ is considered light-to-medium crude—oil above this density is deemed as heavy oil or bitumen.

Dilbit
Bitumen that has been reduced in viscosity through addition of a diluent such as condensate or naphtha.

Diluent
A light hydrocarbon blended with bitumen to enable pipeline transport. See Condensate.

Extraction
A process, unique to the oil sands industry, that separates the bitumen from the oil sand using hot water, steam and caustic soda.

Froth treatment
The means to recover bitumen from the mixture of water, bitumen and solids ("froth") produced in hot water extraction (in mining-based recovery).

Gasification
A process to partially oxidize any hydrocarbon, typically heavy residues, to a mixture of hydrogen and carbon monoxide. Can be used to produce hydrogen and various energy by-products.

Groundwater
Water accumulations below the Earth's surface that supply fresh water to wells and springs.

Heavy crude oil
Oil with a gravity below 22 degrees API. Heavy crudes must be blended or mixed with condensate to be shipped by pipeline.

Hydrocracking
Refining process for reducing heavy hydrocarbons into lighter fractions, using hydrogen and a catalyst, can also be used in upgrading bitumen.

Hydrotransport
A slurry process that transports water and oil sand through a pipeline to primary separation vessels located in an extraction plant.

Hydrotreater
An upgrading/refining process unit that reduces sulphur and nitrogen levels in crude oil fractions by catalytic addition of hydrogen.

In situ
A Latin phrase meaning "in its original place." In situ recovery refers to various drilling-based methods used to recover deeply buried bitumen deposits.

In situ combustion
An enhanced oil recovery method that works by generating combustion gases (primarily CO and CO_2) downhole, which then "push" the oil towards the recovery well.

Lease
A legal document from the province of Alberta giving an operator the right to extract bitumen from the oil sand existing within the specified lease area. The land must be reclaimed and returned to the Crown at the end of operations.

Light crude oil
Liquid petroleum with a gravity of 28 degrees API or higher. A high-quality light crude oil might have a gravity of about 40 degrees API. Upgraded crude oils from the oil sands run around 30–33 degrees API (compared to 32–34 for Light Arab and 37–40 for West Texas Intermediate).

Mature fine tailings
A gel-like material resulting from the processing of clay fines contained within the oil sands.

Oil sands
Bitumen-soaked sand deposits located in three geographic regions of Alberta: Athabasca, Cold Lake and Peace River. The Athabasca deposit is the largest, encompassing more than 42,340 square kilometres. Total in-place deposits of bitumen in Alberta are estimated at 1.7 trillion to 2.5 trillion barrels.

Overburden
A layer of sand, gravel and shale between the surface and the underlying oil sand in the mineable oil sands region that must be removed before oil sands can be mined.

Permeability
The capacity of a substance (such as rock) to transmit a fluid, such as crude oil, natural gas or water. The degree of permeability depends on the number, size and shape of the pores and/or fractures in the rock and their interconnections. It is measured by the time it takes a fluid of standard viscosity to move a given distance. The unit of permeability is the Darcy.

Petroleum coke
Solid, black hydrocarbon that is left as a residue after the more valuable hydrocarbons have been removed from the bitumen by heating the bitumen to high temperatures.

Primary production
An in situ recovery method that uses natural reservoir energy (such as gas drive, water drive and gravity drainage) to displace hydrocarbons from the reservoir into the wellbore and up to the surface. Primary production uses an artificial lift system in order to reduce the bottomhole pressure or increase the differential pressure to sustain hydrocarbon recovery, since reservoir pressure decreases with production.

Reclamation
Returning disturbed land to a stable, biologically productive state. Reclaimed property is returned to the province of Alberta at the end of operations.

Steam assisted gravity drainage (SAGD)
An in situ production process using two closely spaced horizontal wells, one for steam injection and the other for production of the bitumen/water emulsion.

Surface mining
Operations to recover oil sands by open-pit mining using trucks and shovels. Less than 20 per cent of Alberta's oil sands resources are located close enough to the surface (within 75 metres) for mining to be economic.

Synthetic crude oil
A manufactured crude oil composed of naphtha, distillate and gas oil, boiling range material. Can range from high-quality, light sweet bottomless crude to heavy, sour blends.

Tailings
A combination of water, sand, silt and fine clay particles that is a by-product of removing the bitumen from the oil sand through the extraction process.

Tailings settling basin
The primary purpose of the tailings settling basin is to serve as a process vessel, allowing time for tailings water to clarify and silt and clay particles to settle so that the water can be reused in extraction. The settling basin also acts as a thickener, preparing mature fine tails for final reclamation.

Thermal recovery
Any in situ process where heat energy (generally steam) is used to reduce the viscosity of bitumen to facilitate recovery.

Upgrading
The process of converting heavy oil or bitumen into synthetic crude either through the removal of carbon (coking) or the addition of hydrogen (hydroconversion).

Viscosity
The ability of a liquid to flow. The lower the viscosity, the more easily the liquid will flow.

CONTACTS

Oil Sands Producers

- Alberta Oilsands
- Athabasca Oil Corporation
- Baytex Energy
- BlackPearl Resources
- Brion Energy Corporation
- Canadian Natural Resources
- Cenovus Energy
- Chevron Canada
- CNOOC Limited
- Connacher Oil and Gas
- ConocoPhillips Canada
- Devon Canada
- Enerplus Resources Fund
- E-T Energy
- Grizzly Oil Sands
- Harvest Operations Corp.
- Husky Energy
- Imperial Oil
- Ivanhoe Energy
- Japan Canada Oil Sands
- Koch Exploration Canada
- Korea National Oil Corporation
- Laricina Energy
- Marathon Oil
- MEG Energy
- Nexen
- North West Upgrading
- N-Solv
- Oak Point Energy
- Occidental Petroleum Corporation
- Osum Oil Sands
- Pan Orient Energy
- Paramount Resources Ltd.
- Pengrowth Energy Corporation
- Petrobank Energy and Resources
- PetroChina
- Shell Canada
- Sinopec
- Southern Pacific Resource Corp.
- Statoil Canada
- Suncor Energy
- Sunshine Oilsands
- Syncrude
- Talisman Energy
- Teck Resources
- Total E&P Canada
- Value Creation Group

Associations/Organizations

- Alberta Chamber of Resources
- Alberta Chambers of Commerce
- Alberta Energy
- Alberta Energy Regulator
- Alberta Enterprise and Advanced Education
- Alberta Environment and Sustainable Resource Development
- Alberta Innovates
- Alberta's Industrial Heartland Association
- Building Trades of Alberta
- Canada's Oil Sands Innovation Alliance
- Canadian Association of Geophysical Contractors
- Canadian Association of Petroleum Producers
- Canadian Heavy Oil Association
- In Situ Oil Sands Alliance
- Lakeland Industry & Community Association
- Natural Resources Conservation Board
- Oil Sands Developers Group
- Oil Sands Secretariat
- Petroleum Technology Alliance Canada

For more information, visit us at

www.albertacanada.com